

symmetry and asymmetry not only of the entire costal margins but of the inner and outer portions of each costal margin. Movements of the costal margins are modified with changes in the curve of the plane of the diaphragm, by paresis of either the diaphragm or the intercostal muscles and by synechia between the diaphragm and the thoracic wall. Such studies improve the accuracy with which one differentiates between infraphrenic and supraphrenic disease, and enable one also to estimate the conformation of the heart and the size of the pericardial sac and to differentiate between lesions which cause phrenic displacement and those which do not modify the plane of the diaphragm.

### EARLY LESIONS IN THE GALL-BLADDER.<sup>1</sup>

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THE study of early pathological conditions in the gall-bladder has been greatly facilitated by cholecystectomy, an operation which many surgeons have deemed advisable in preference to cholecystostomy. In their experience many patients in whom the organ had been drained returned to them with symptoms unrelieved. The desired relief in such cases seems to have been accomplished, at least in a much higher percentage, by the secondary complete removal of the organ. This experience with such cases following a secondary cholecystectomy has led, in the last five years, to the custom of primary cholecystectomy in preference to cholecystostomy in patients with a visible lesion and also in some patients in whom there is no visible gross pathology but a definite clinical picture pointing to this organ, plus enlargement of lymphatic glands along the ducts.

From January 1, 1913, to January 1, 1919, 4998 gall-bladders were removed at the Mayo Clinic. Of these, 4824 (96.5 per cent.) showed unquestioned gross pathological lesions (Table I).

In this series of conditions it may be seen there were 157 with slight lesions and 17 grossly "normal," most of which showed definite changes in the villi on examination with a high-power dissecting microscope or in microscopic sections.

<sup>1</sup> Presented before the American Gastro-enterological Association, Atlantic City, June, 1919.

## CLASSIFICATION OF 4998 GALL-BLADDERS.

	Specimens.
1. Cholecystitis catarrhalis acuta . . . . .	17
Cholecystitis catarrhalis acuta, with "strawberry" appearance . . . . .	9
2. Cholecystitis catarrhalis subacuta . . . . .	112
3. Cholecystitis catarrhalis chronica . . . . .	2021
Cholecystitis catarrhalis chronica, with "strawberry" appearance . . . . .	948
Cholecystitis catarrhalis chronica, with adenoma in the wall . . . . .	1
Cholecystitis catarrhalis chronica, with accessory fundus . . . . .	1
Cholecystitis catarrhalis chronica, with diverticula . . . . .	4
Cholecystitis catarrhalis chronica, with old perforation . . . . .	1
Cholecystitis catarrhalis chronica, with very slight lesion . . . . .	38
Cholecystitis catarrhalis chronica (?) . . . . .	157 (3.10%)
4. Cholecystitis catarrhalis papillomatosa . . . . .	212
Cholecystitis catarrhalis papillomatosa, with "strawberry" appearance . . . . .	129
Cholecystitis catarrhalis papillomatosa, with "strawberry" and cystic appearance . . . . .	1
Cholecystitis catarrhalis papillomatosa, with a diverticulum . . . . .	1
Cholecystitis catarrhalis papillomatosa, subacuta . . . . .	1
Cholecystitis catarrhalis papillomatosa, malignum . . . . .	1
Cholecystitis catarrhalis papillomatosa, malignum (?) . . . . .	1
5. Cholecystitis catarrhalis carcinomatosa . . . . .	22
Cholecystitis catarrhalis carcinomatosa (?) . . . . .	1
6. Cholecystitis chronica . . . . .	900
Cholecystitis chronica, with honeycomb appearance . . . . .	8
Cholecystitis chronica, with perforation of wall . . . . .	1
Cholecystitis chronica, with calcification of wall . . . . .	1
7. Cholecystitis chronica cystica . . . . .	112
Cholecystitis chronica cystica (empyema) . . . . .	24
8. Cholecystitis acuta . . . . .	81
Cholecystitis acuta, with perforation of wall . . . . .	1
9. Cholecystitis purulenta necrotica . . . . .	168
Cholecystitis purulenta necrotica, with "strawberry" appearance . . . . .	5
10. Cholecystitis ulcerosa . . . . .	1
11. Cholecystitis epitheliomatosa (with gall-stones) . . . . .	1
12. "Normal" gall-bladders (gross diagnosis) . . . . .	17 (0.31%)

The early changes in the gall-bladder consist of:

1. Congestion and edema of the villi frequently associated with a bulbous appearance (Figs. 1, 2, 3 and 4) which, on casual gross examination, makes the villi appear cystic. Occasionally they are cystic. The mucosa in advanced stages of this congestion and edema sometimes presents the appearance of being covered with small fish-scales (Fig. 5), an appearance which is due to the presence of a lipid infiltration in the stroma or epithelial cells (Figs. 6, 7 and 8).

2. Local or general slight degree of lymphocytic infiltration which manifests itself only in a slight enlargement of the villi (Figs. 9 and 10) and a cloudy or duller appearance.

3. Local or general slight degree of lymphocytic infiltration is seen in the mucosa alone, which might possibly be considered normal, since the mucosa probably contains a certain number of lymphocytes; but when seen in association with a lymphocytic infiltration in the submucosa, muscularis and subserosa (Fig. 11) very probably indicates a pathological condition. Such infiltra-

tion is associated with a bulbous appearance of the villi or a thickening of the bases of the villi (Figs. 12 and 13).

4. The presence of fibrosis (Fig. 13) in the villi which usually are not thin and tentacular (in sections) like those of the perfectly normal organ. The fibrosis sometimes extends into the submucosa, muscularis and subserosa (Fig. 11).



FIG. 1.—Villi of a gall-bladder in an early stage of congestion and edema.



FIG. 2.—Villi of a gall-bladder, showing congestion and distortion in early cholecystitis.

5. The presence of lymphocytic infiltration and fibrosis, such as described above, plus the presence of a finely granular or lipoid substance in the epithelium (Figs. 6 and 7) or just below the epithelium in the mucosa (Fig. 8).

6. The presence of slight or no lymphocytic infiltration and fibrosis plus the presence of large spheroidal cells filled with finely granular lipid substance in the mucosa and sometimes in the



FIG. 3.—Edematous villi having a bulbous appearance and showing pale areas which are due to deposits of a lipid substance in the epithelium or just beneath the epithelium in the connective-tissue stroma.

submucosa (Fig. 8). These cells are similar to those which have been described in the so-called "strawberry" gall-bladder,<sup>2,3</sup> and in papillomas.<sup>1</sup> This substance may not be visible grossly, but



FIG. 4.—Villi in an edematous condition.

may sometimes be detected with the high-power dissecting microscope (Fig. 3). It is the substance which gives villi in the "strawberry" gall-bladder and papillomas their yellow or white appearance.

The conditions which have been described above do not alter the gross exterior of the organ, nor do they alter greatly the internal appearance to the naked eye.



FIG. 5.—A condition of edema of the villi associated with deposits of lipoid material in the epithelium and stroma.



FIG. 6.—Diagrammatic sketch, showing the location of lipoid substance in the epithelium. Made from a section stained with scarlet R.

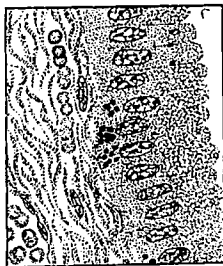


FIG. 7.—Diagrammatic sketch, showing the location of the lipoid substance in the cells but near the stroma.



FIG. 8.—Diagrammatic sketch, showing the lipid substance in the epithelium and also in the cells of the stroma.

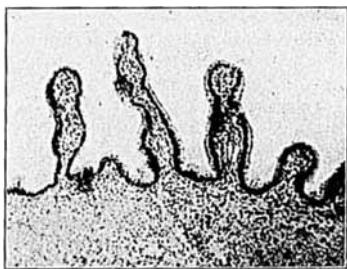


FIG. 9.—Section through the mucosa of a gall-bladder in a mild condition of chronic catarrhal cholecystitis. The villi contain many lymphocytes.

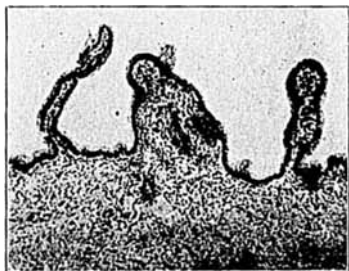


FIG. 10.—Section through the mucosa of a gall-bladder, showing lymphocytic infiltration of the villi and the underlying stroma.

It is this group of slight pathological reactions which has made many surgeons, who believe that a cholecystectomy is the opera-



FIG. 11.—Section of the submucosa of a gall-bladder, showing lymphocytic infiltration and fibrosis.

tion of choice in cholecystitis, somewhat slow in carrying out their belief in practice. Also, it is probably this group which is so fre-

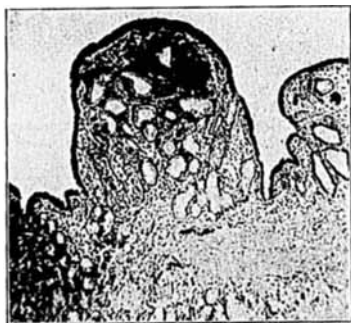


FIG. 12.—Section through the mucosa of a gall-bladder, showing lymphocytic infiltration and fibrosis in the villi. There is a glandular increase and the villi have lost their tentacular appearance.

quently seen in association with stones and has led many observers to believe that stones occur in perfectly normal gall-bladders.

With our present knowledge we are not prepared to say definitely that such early conditions alone present sufficient symptoms to make a definite clinical syndrome, especially in view of the fact that recent studies made by one of us (MacCarty) indicate that such conditions in the gall-bladder are also associated with somewhat similar changes in the extrahepatic and intrahepatic bile ducts, which might readily interfere with hepatic function and therefore produce clinical disturbances. As a matter of fact such patients do present some general disturbances which clinicians refer to under the broad heading of toxemia.



FIG. 13.—Section through the mucosa of a gall-bladder, showing lymphocytic infiltration, fibrosis and distortion of the villi.

This paper has for its object the stimulation of greater interest and more detailed research in conditions of the bile passages which have heretofore been mistaken for normal.

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